



# Ammunition Enterprise Supplier Quality

## Process Capability, Control & Improvement Requirements

### Supplier Presentation

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# Objective

- Supplier Presentation supports Process Capability, Control & Improvement (PCCI) marketing / awareness campaign
- Presentation to be distributed by individual Project Officers to suppliers as they see fit
- Presentation meant to stand alone and not require explanation
- Comments on requirements are encouraged
- Contact Michael Berry with all questions and comments
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# PCCI Requirements Background

- Ammunition Enterprise (AE) lacks consistent Process Control requirements, including implementation and application requirements, satisfying all stakeholders and in support of AE Supplier Quality (SQ) goals
- AE intends to implement single, integrated Process Capability, Control & Improvement (PCCI) Requirements that satisfy all stakeholders and:
  - Identifies and assesses risk processes & design characteristics for supplier
  - Determines supplier process capability for identified risk processes
  - Controls identified risk processes
  - Initiates continuous improvement efforts for identified risk processes & design characteristics
  - Utilizes commercial best practices
  - Interface with higher level system for AE SQ



# Current Process Control Requirements

- JMC Clause (52.246-4506)
  - General & Detail SPC requirements
- ARDEC Clause (ARDEC 32)
  - Alternate to Lot Acceptance Sampling
- Program unique process control requirements



# Draft Requirements Outline

- (Paragraph A) Overview
  - Process Control System
- (B) Key Characteristics
  - Identified by Integrated Product Team (IPT) or,
  - Identified by Process Failure Modes & Effects Analysis (PFMEA) or,
  - [Default] Identified by Technical Data Package (TDP) characteristic classifications from Design Failure Modes & Effects Analysis (DFMEA)
- (C) Capability
  - Process Flow Chart for Manufacturing Process
  - PFMEA for Manufacturing Process
  - Process Capability Study for Key Characteristics
  - Repeatability & Reproducibility (R&R) Study for Key Characteristics
- (D) Control
  - Process Control Plan (PCP) deliverable for Key Characteristics
- Improvement
  - (E) Incentive (Alternate to Lot Acceptance Sampling)
  - (F) Deterrent (CARs & RFDs result in identification of Key Characteristics)



## What's different in Draft PCCI Requirements?

# SPC is not mandated

Process Control for Key Characteristics is mandated

### Absent

- General Statistical Process Control (SPC) Plan requirements
- Detailed requirements in clause for SPC



# Key Characteristics

- Allows adaptability of requirements
- Key characteristics identified
  - by Integrated Product Team (IPT) during solicitation preparation or,
  - by supplier Process Failure Modes & Effects Analysis (PFMEA) after award or,
  - [Default] by Technical Data Package (TDP) characteristic classifications from Design Failure Modes & Effects Analysis (DFMEA),
- Program unique selection with knowledge of
  - Item complexity
  - Quantity being procured
  - Industrial base capability
- Improvement over time



# Flow Chart & PFMEA

- Increases Supplier and Government knowledge of process and product
- Creates improvement environment within Government / Supplier IPT based on risk
- Facilitates PCP approval and process & design improvements



# Process Control Plan (PCP)

- Statistical Process Control (SPC) is not mandated
- Process Control for Key Characteristics is mandated
  - Responsibility of supplier
  - Utilizing best practices
  - Resulting in objective evidence
- Focuses on method of controlling process more than method of monitoring process
- Statistical sampling is not Process Control
- Statistical Control methods are still preferred method of Process Control



## Acceptance of product based on PCP

- Sampling inspection only effective when process is in control
- Communicates Government expectation for suppliers to use capable processes
- Will reduce risk of Lot Acceptance inspection and test failures
- Data generated from process capability and PCP support submission and approval of alternate methods of acceptance and reduction or elimination of Lot Acceptance inspection and test sampling



# Requirement Review

## Requirement 1

### System

Supplier responsible for developing Process Control System (PCS). Process Control Plan (PCP) is quality deliverable documenting PCS application to this program

### Requirement Language

- a. The Contractor shall establish a Process Control System that includes procedures, systems and software that provide control over production processes. This Process Control System shall complement the requirements of an ISO 9001-2000 or equivalent Quality Management System as well as all contract quality requirements. Statistical Process Control (SPC), when utilized, shall be implemented in accordance with ISO 11462-1 and ANSI/ASQC B1, B2, and B3. A Process Control Plan (PCP) shall be submitted to the Government for review and approval as stipulated per the DD Form 1423 and DI-MGMT-80004. Demonstration of process capability in accordance with approved PCP shall be accomplished prior to production and acceptance of product shall be based on verification of process capability in accordance with approved PCP.



# Requirement Review

## Requirement 2

### Key Characteristics

Government defines Key Characteristics or number of characteristics, processes or operations resulting from analysis that will be considered Key.

This in adaptability of requirements and is based on item complexity, intended use, quantity being procured and industrial base capability

If everything is key,  
nothing is key

Government selected Key  
Characteristics

### Requirement Language

b. Key characteristics are those characteristics identified in TDP documentation as critical and major plus any contractor selected characteristics. The contractor shall analyze all process and operation parameters affecting key characteristics for application of Process Control techniques unless otherwise required by check mark:

- (1) ☐ Key characteristics and/or tools, techniques and control methods to be applied are those listed in paragraph g as tailorable characteristics. Alternate control methods can be suggested by the contractor but require Government approval.
- (2) ☐ Key characteristics are \_\_\_\_ characteristics or identified process or operations parameters resulting from PFMEA of entire process. Government reserves the right to identify the specific characteristic, process, or operation parameters from the PFMEA as a key characteristic.

g. If box b(1) was checked above, the tailored key characteristics and/or tools, techniques and control methods are specified as follows:



# Requirement Review

## Requirement 3

### Capability

Supplier creates process flow chart and perform PFMEA for entire proposed process, including subvendors

Supplier analyzes and document capabilities of those processes and inspection equipment affecting Key Characteristics

### Requirement Language

- c. The contractor's analysis shall include processes and operations under the control of the prime contractor and those under the control of subcontractor or vendor facilities. The contractor shall create a process flow chart for the entire process and perform Process Failure Modes and Effects Analysis (PFMEA) for all processes identified on the process flow chart. The contractor shall identify, define, and delineate specific controls applicable for each process and operation that affects key characteristics. The contractor shall conduct process capability studies and Repeatability & Reproducibility (R & R) studies for measurement systems on all process and operation parameters affecting key characteristics.



# Requirement Review



## Requirement Language

d. The contractor shall prepare and implement a Process Control Plan (PCP). This PCP shall be based upon and include results of process flow chart and PFMEA, and process capability studies and R & R studies for all process and operation parameters affecting key characteristics. The PCP shall address control methods, process and inspection equipment, action plan for out of control conditions, and process capability at stated production rate. Capable processes shall be one of the criteria for Government acceptance of product. When utilizing statistical methods, a Cpk index (a type of process capability index sensitive to whether the process is centered, but insensitive to special cause) shall be calculated. A Capable process for each process and operation parameter that affects key characteristics shall have a Cpk greater than or equal to 1.0 or as stated as follows: \_\_\_\_\_.



# Requirement Review

## Requirement 5

### Improvement - Incentive

Processes documented as required by paragraph (c) and under control as required by paragraph (d) can result in reduction or elimination of conformance inspection or performance testing

## MIL-STD-1916 Request

### Requirement Language

e. When the process or operation parameter under control has demonstrated both stability and capability, the Contractor may request in writing that inspection or testing performed in accordance with contract requirements be reduced or eliminated in accordance with MIL-STD-1916. At least three (3) consecutive lots or as stated as follows \_\_\_\_\_ *shall* have been inspected and accepted before reduction/elimination is requested.



# Requirement Review

## Requirement 6

Improvement - Deterrent

CARs and RFDs will result in addition of Key Characteristics to those required by paragraph (b) or reassessment of PCP.

Revised PCP

## Requirement Language

f. All Corrective Action Requests (CARs) and Requests For Deviation (RFDs) generated for identification of product nonconformances shall result in the addition of characteristics to contractually required key characteristic list and require implementation of actions per paragraphs (c) and (d) above with submittal to the PCO for Government approval. If the CARs and RFDs are relating to characteristic, processes or operations already identified in the PCP then those actions required by paragraph (c) and (d) will be reassessed and submitted to the PCO for Government approval. The Government reserves the right to withhold acceptance of product until the revised PCP is approved by the Government.



# Summary

- AE intends to implement single, integrated Process Capability, Control & Improvement (PCCI)
- PCCI intended to replace
  - JMC Clause (52.246-4506)
    - General & Detail SPC requirements
  - ARDEC Clause (ARDEC 32)
    - Alternate to Lot Acceptance Sampling
  - Program unique process control requirements
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